Copy for the designated Office (DO/US)

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

COMMUNICATION IN CASES FOR WHICH NO OTHER FORM IS APPLICABLE

To:
SCHÄFERJOHANN, Volker
Deutsche Thomson-Brandt GmbH
European Patent Operations
Karl-Wiechert-Allee 74
D-30625 Hannover
ALLEMAGNE

Date of mailing (*day/month/year*) 10 November 2000 (10.11.00)	
Applicant's or agent's file reference PD990017	**REPLY DUE** see paragraph 1 below
International application No. PCT/EP00/02439	International filing date (*day/month/year*) 20 March 2000 (20.03.00)
Applicant DEUTSCHE THOMSON-BRANDT GMBH	

1. ☐ REPLY DUE within _____ months/days from the above date of mailing

☐ NO REPLY DUE, however, see below

☒ IMPORTANT COMMUNICATION

☐ INFORMATION ONLY

2. COMMUNICATION:

Please be informed that the receiving Office has notified the International Bureau that the international filing date for the above-identified international application should read

20 March 2000 (20.03.2000)

instead of:

17 March 2000 (17.03.2000)

A copy of this communication has been sent to the receiving Office RO/EP, the International Searching Authority ISA/EP, and all designated Offices which have been notified of receipt of the record copy.
A republication will take place promptly.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer V. Gross
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.83.38

Form PCT/IB/345 (July 1992)

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and Administrative Instructions, Section 422)

To:

SCHÄFERJOHANN, Volker
Deutsche Thomson-Brandt GmbH
European Patent Operations
Karl-Wiechert-Allee 74
D-30625 Hannover
ALLEMAGNE

Date of mailing (day/month/year)
12 January 2001 (12.01.01)

Applicant's or agent's file reference
PD990017

IMPORTANT NOTIFICATION

International application No.
PCT/EP00/02439

International filing date (day/month/year)
20 March 2000 (20.03.00)

1. The following indications appeared on record concerning:

[X] the applicant [X] the inventor [ ] the agent [ ] the common representative

Name and Address
HEIGHWAY, Timothy
25 Pytchley St.
Northampton
Northamptonshire NN1 5Qy
United Kingdom

State of Nationality: GB
State of Residence: GB
Telephone No.:
Facsimile No.:
Teleprinter No.:

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

[ ] the person [ ] the name [X] the address [ ] the nationality [ ] the residence

Name and Address
HEIGHWAY, Timothy
20 The Avenue
Spinney Hill
Northampton NN3 6BA
United Kingdom

State of Nationality: GB
State of Residence: GB
Telephone No.:
Facsimile No.:
Teleprinter No.:

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

[X] the receiving Office
[ ] the International Searching Authority
[X] the International Preliminary Examining Authority
[ ] the designated Offices concerned
[X] the elected Offices concerned
[ ] other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

Authorized officer
F. Baechler
Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and Administrative Instructions, Section 422)

To:

SCHÄFERJOHANN, Volker
Deutsche Thomson-Brandt GmbH
European Patent Operations
Karl-Wiechert-Allee 74
D-30625 Hannover
ALLEMAGNE

Date of mailing (day/month/year)
06 août 2001 (06.08.01)

Applicant's or agent's file reference
PD990017

IMPORTANT NOTIFICATION

International application No.
PCT/EP00/02439

International filing date (day/month/year)
20 mars 2000 (20.03.00)

1. The following indications appeared on record concerning:

[X] the applicant [ ] the inventor [ ] the agent [ ] the common representative

Name and Address
DEUTSCHE THOMSON-BRANDT GMBH
Hermann-Schwer-Strasse 3
D-78048 Villingen-Schwenningen
Germany

State of Nationality: DE
State of Residence: DE
Telephone No.:
Facsimile No.:
Teleprinter No.:

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

[X] the person [X] the name [X] the address [X] the nationality [X] the residence

Name and Address
THOMSON LICENSING S.A.
46, quai A. Le Gallo
F-92100 Boulogne-Billancourt
France

State of Nationality: FR
State of Residence: FR
Telephone No.: 33 1 41 86 52 73
Facsimile No.: 33 1 41 86 56 34
Teleprinter No.:

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

[X] the receiving Office
[ ] the International Searching Authority
[ ] the International Preliminary Examining Authority
[ ] the designated Offices concerned
[X] the elected Offices concerned
[ ] other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

Authorized officer
Beate Giffo-Schmitt
Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
PD990017		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/EP 00/ 02439	17/03/2000	01/04/1999
Applicant		
DEUTSCHE-THOMSON-BRANDT GMBH		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established, according to Rule 38 2(b). by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 1

   [X] as suggested by the applicant.

   [ ] None of the figures.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

PATENT COOPERATION TREATY

EXPRESS MAIL EL685391717US

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

Schäferjohann, Volker
DEUTSCHE THOMSON-BRANDT GMBH
European Patent Operations
Karl-Wiechert-Allee 74
D-30625 Hannover
ALLEMAGNE

THOMSON multimedia
RECEIVED
03. Mai 2001
Patent Department
Administration-Hannover

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing *(day/month/year)*	30.04.2001
Applicant's or agent's file reference PD990017	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP00/02439	20/03/2000	01/04/1999

Applicant
DEUTSCHE-THOMSON-BRANDT GMBH et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/	Authorized officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Koski, P Tel.+49 89 2399-2709

Form PCT/IPEA/416 (July 1992)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
PD990017		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP00/02439	20/03/2000	01/04/1999
International Patent Classification (IPC) or national classification and IPC G06F13/42		
Applicant DEUTSCHE-THOMSON-BRANDT GMBH et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
10/10/2000	30.04.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Rudolph, S Telephone No. +49 89 2399 7526

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/02439

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-11 as originally filed

Claims, No.:

1-8 as originally filed

Drawings, sheets:

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-8
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-8
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-8
	No:	Claims	

2. Citations and explanations
   see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The international application relates to a method for the compilation of bus packets for isochronous data transmission via a data bus and to an apparatus for carrying out said method.

As it is known from the prior art (IEC 61883) throughout isochronous data transmission CIP (common isochronous packet) headers are added to the beginning of each bus packet after the bus packet header in order to enable the receiving station to correctly evaluate the data of received packets. During the transmission the CIP headers of consecutive bus packets must be updated in the DBC (data block counter) section. In the bus interface the CIP header of a bus packet has to be present twice, i.e. one for a completely compiled bus packet and another one in order to create the CIP header of a succeeding packet while new data is provided by the application process.

In order to cope with aforementioned difficulties, prior art systems for performing isochronous data transmissions provide two separate special registers for storing CIP headers and a buffer memory for storing the data of respective bus packets. A selection unit is provided for reading the correct CIP header from one of the two special registers. Said selection unit transfers said data to a data transmitting unit at the correct point of time, fetches the associated data from the buffer memory and attaches it to the respective CIP header.

The technical problem addressed by the present application is to provide a simpler solution for performing isochronous data transmission, i.e. without the need of a selection unit performing the above mentioned functions.

1. Claim 1

The solution according to claim 1 of the international application discloses to write the isochronous data format header to a special register and to a buffer memory for bus

packets when the isochronous data transmission is set up in a data transmitting device and to attach the useful data of the bus packet to the isochronous data format header in the buffer memory.

Neither the technical problem nor the solution of present claim 1 is disclosed or suggested by one of the prior art documents cited in the International Search Report. The requirements of Article 33(2) PCT concerning novelty and Article 33(3) PCT concerning inventive step are thus complied with.

2. Claims 2-8

Method claims 2 - 5 depend on claim 1 which was found novel and inventive in the sense of Articles 33(2) and (3) PCT. Consequently, also claims 2 - 5 also meet the requirements of Articles 33(2) and (3) PCT.

Claims 6 - 8 disclose an apparatus for carrying out the method according claims 1 - 5 and thus correspond to the preceding method claims. Consequently, also claims 6 - 8 also meet the requirements of Articles 33(2) and (3) PCT.

3. Claims 1 - 8 meet the requirements of Article 33(4) PCT concerning industrial applicability.

Re Item VIII

Certain observations on the international application

The features following the term "in particular" used in present dependent claims 2 and 5 have no limiting effect on the scope of said claims. To avoid ambiguity of the claims in the sense of Article 6 PCT said term should have been avoided (see PCT Preliminary International Examination Guidelines C-III-4.6).

PATENT COOPERATION TREATY

PCT

REC'D 02 MAY 2001
WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
PD990017		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP00/02439	20/03/2000	01/04/1999
International Patent Classification (IPC) or national classification and IPC G06F13/42		
Applicant DEUTSCHE-THOMSON-BRANDT GMBH et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

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3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
10/10/2000	30.04.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Rudolph, S Telephone No. +49 89 2399 7526

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/02439

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-11 as originally filed

Claims, No.:

1-8 as originally filed

Drawings, sheets:

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-8
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-8
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-8
	No:	Claims	

2. Citations and explanations
   see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The international application relates to a method for the compilation of bus packets for isochronous data transmission via a data bus and to an apparatus for carrying out said method.

As it is known from the prior art (IEC 61883) throughout isochronous data transmission CIP (common isochronous packet) headers are added to the beginning of each bus packet after the bus packet header in order to enable the receiving station to correctly evaluate the data of received packets. During the transmission the CIP headers of consecutive bus packets must be updated in the DBC (data block counter) section. In the bus interface the CIP header of a bus packet has to be present twice, i.e. one for a completely compiled bus packet and another one in order to create the CIP header of a succeeding packet while new data is provided by the application process.

In order to cope with aforementioned difficulties, prior art systems for performing isochronous data transmissions provide two separate special registers for storing CIP headers and a buffer memory for storing the data of respective bus packets. A selection unit is provided for reading the correct CIP header from one of the two special registers. Said selection unit transfers said data to a data transmitting unit at the correct point of time, fetches the associated data from the buffer memory and attaches it to the respective CIP header.

The technical problem addressed by the present application is to provide a simpler solution for performing isochronous data transmission, i.e. without the need of a selection unit performing the above mentioned functions.

1. Claim 1

The solution according to claim 1 of the international application discloses to write the isochronous data format header to a special register and to a buffer memory for bus

packets when the isochronous data transmission is set up in a data transmitting device and to attach the useful data of the bus packet to the isochronous data format header in the buffer memory.

Neither the technical problem nor the solution of present claim 1 is disclosed or suggested by one of the prior art documents cited in the International Search Report. The requirements of Article 33(2) PCT concerning novelty and Article 33(3) PCT concerning inventive step are thus complied with.

2. Claims 2-8

Method claims 2 - 5 depend on claim 1 which was found novel and inventive in the sense of Articles 33(2) and (3) PCT. Consequently, also claims 2 - 5 also meet the requirements of Articles 33(2) and (3) PCT.

Claims 6 - 8 disclose an apparatus for carrying out the method according claims 1 - 5 and thus correspond to the preceding method claims. Consequently, also claims 6 - 8 also meet the requirements of Articles 33(2) and (3) PCT.

3. Claims 1 - 8 meet the requirements of Article 33(4) PCT concerning industrial applicability.

Re Item VIII

Certain observations on the international application

The features following the term "in particular" used in present dependent claims 2 and 5 have no limiting effect on the scope of said claims. To avoid ambiguity of the claims in the sense of Article 6 PCT said term should have been avoided (see PCT Preliminary International Examination Guidelines C-III-4.6).

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
12 October 2000 (12.10.2000)

PCT

(10) International Publication Number
WO 00/60478 A3

(51) International Patent Classification[7]: G06F 13/42

(21) International Application Number: PCT/EP00/02439

(22) International Filing Date: 20 March 2000 (20.03.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
199 14 838.4 1 April 1999 (01.04.1999) DE

(71) Applicant *(for all designated States except US)*: **DEUTSCHE THOMSON-BRANDT GMBH** [DE/DE]; Hermann-Schwer-Strasse 3, D-78048 Villingen-Schwenningen (DE).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **HEIGHWAY, Timothy** [GB/GB]; 25 Pytchley St., Northampton, Northamptonshire NN1 5Qy (GB). **GAEDKE, Klaus** [DE/DE]; Schaumannweg 22, D-30659 Hannover (DE). **SCHWEIDLER, Siegfried** [DE/DE]; Südfeld 10, D-30989 Gehrden (DE).

(74) Agent: **SCHÄFERJOHANN, Volker**; Deutsche Thomson-Brandt GmbH, European Patent Operations, Karl-Wiechert-Allee 74, D-30625 Hannover (DE).

(81) Designated States *(national)*: AE, AL, AU, BA, BB, BG, BR, CA, CN, CR, CU, CZ, DM, EE, GD, GE, HR, HU, ID, IL, IN, IS, JP, KP, KR, LC, LK, LR, LT, LU, LV, MA, MG, MK, MN, MW, MX, NO, NZ, PL, RO, SG, SI, SK, TR, TT, UA, US, UZ, VN, YU, ZA.

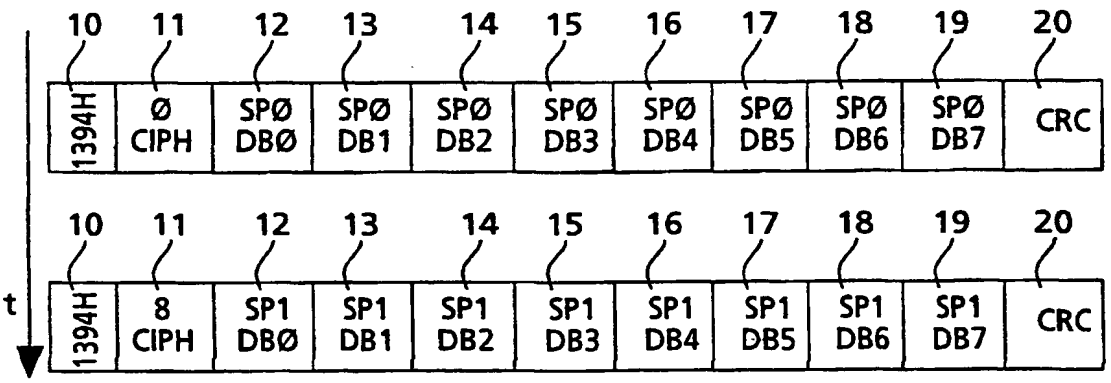
(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*

(88) Date of publication of the international search report:
25 January 2001

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD FOR THE COMPILATION OF BUS PACKETS FOR ISOCHRONOUS DATA TRANSMISSION VIA A DATA BUS, AND APPARATUS FOR CARRYING OUT THE METHOD



(57) Abstract: The format of the transmission of isochronous data packets via the IEEE 1394 bus is defined in the IEC 61883 Standard. A bus packet used to transmit the data has a header (1394H) at the beginning, which header describes the format of the bus packet. This is then followed by an isochronous data format header (CIPH), which defines the data format of the useful data in the useful packet. The invention is concerned with the problem of compiling a bus packet for transmission via the 1394 bus. In the case of the invention, this is done in such a way that when the isochronous data transmission is set up, the isochronous data format header (CIPH) prescribed by the application is written both to a special register (38) that is provided and to the buffer memory (32) for the bus packets and the useful data are attached thereto. As a result, it is then possible that a data transmitting section (35) has to take the data to be transmitted, including the isochronous data format header (CIPH), only from the buffer memory (32). A multiplex operation joining together the data and the isochronous data format header (CIPH) need not then be effected for the transmission of the data.

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 874 503 A (SONY CORP) 28 October 1998 (1998-10-28) column 1, line 9 - line 56 column 1, line 9 -column 2, line 7 column 2, line 58 -column 4, line 32 column 6, line 30 -column 7, line 13 abstract; claims 1-3; figures 3,4	1-8
A	EP 0 860 823 A (TOKYO SHIBAURA ELECTRIC CO) 26 August 1998 (1998-08-26) page 2, line 21 - line 52 page 4, line 34 -page 5, line 44 page 8, line 40 -page 9, line 47	1-8
A	EP 0 843 482 A (SONY CORP) 20 May 1998 (1998-05-20) the whole document	1-8

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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1

INTERNATIONAL SEARCH REPORT

information on patent family members

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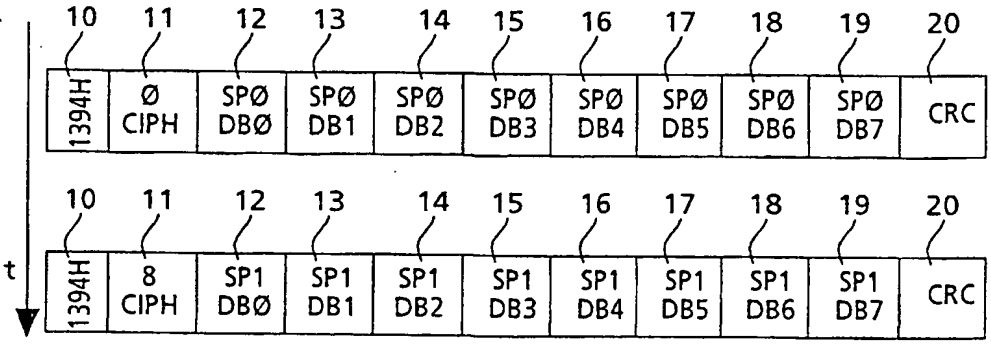

(57) Abstract

The format of the transmission of isochronous data packets via the IEEE 1394 bus is defined in the IEC 61883 Standard. A bus packet used to transmit the data has a header (1394H) at the beginning, which header describes the format of the bus packet. This is then followed by an isochronous data format header (CIPH), which defines the data format of the useful data in the useful packet. The invention is concerned with the problem of compiling a bus packet for transmission via the 1394 bus. In the case of the invention, this is done in such a way that when the isochronous data transmission is set up, the isochronous data format header (CIPH) prescribed by the application is written both to a special register (38) that is provided and to the buffer memory (32) for the bus packets and the useful data are attached thereto. As a result, it is then possible that a data transmitting section (35) has to take the data to be transmitted, including the isochronous data format header (CIPH), only from the buffer memory (32). A multiplex operation joining together the data and the isochronous data format header (CIPH) need not then be effected for the transmission of the data.

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Method for the compilation of bus packets for isochronous data transmission via a data bus, and apparatus for carrying out the method

The invention relates to a method for the compilation of bus packets for isochronous data transmission via a data bus. The invention furthermore relates to an apparatus for carrying out the method. The apparatus may be, in particular, part of a bus interface for the connected data bus.

Prior art

The invention is based on a method for the compilation of bus packets for isochronous data transmission via a data bus of the generic type of the independent Claim 1. For quite a long time now the convergence of the product sectors of consumer electronics (hifi, video, audio) and personal computing has been trumpeted under the catchword multimedia and has actually been propelled by many manufacturers from both camps. The merging of the two product sectors means that work concerned with the subject of data exchange between the equipment of the different product sectors or else between the equipment within one product sector is becoming more and more significant. This is also apparent from the efforts for standardization with regard to this subject, which are already well advanced. Specifically, the so-called IEEE 1394 serial bus already provides an internationally standardized and very widely accepted bus for data exchange between terminals from both product groups. The precise designation of the aforementioned standard is: IEEE Standard for high performance serial bus, (IEEE) STD 1394-1995, IEEE New York, August 1996.

The invention that is to be described here is concerned with the so-called isochronous data transfer within the abovementioned bus system. In this connection isochronous means that data to be transmitted arise regularly at a data source, the data also arising with

approximately the same size each time. Examples of such data sources are video recorders or camcorders, audio devices such as CD players or DAT recorders, and also DVD players or videophone devices, etc. An international standard has been specially developed for this application of isochronous data transmission. The precise designation of this standard is: IEC International Standard 61883 "Consumer Audio/Video Equipment Digital Interface, 1st edition 1998". The first part of this standard describes the general data packet format, the data bus management and the connection management for audio visual data. General transmission rules for control commands are likewise defined.

Very frequent application relates to the transmission of MPEG2-coded video or audio data. The data are transported via the bus in packets, as already mentioned. In this case, the following structure is provided in the abovementioned Standard IEC 61883: the data generated in the data source are divided into so-called data source packets having a defined size. For MPEG2 video data transmission, for example, the standard stipulates that a data source packet is composed for example of 8 data blocks of identical size. In this case, the data block size can be programmed. It may be between one and 256 quadlets, where a quadlet corresponds to a combination of 4 data bytes. The data source packets are transmitted in one or more bus packets in accordance with the IEC 61883 Standard. A bus packet has a so-called isochronous data format header in addition to the elements of bus packet header, useful data field and CRC checksum field. The said isochronous data format header is designated as CIP header (Common isochronous packet) in the abovementioned IEC 61883 Standard. It defines the data format for isochronous data transmission, which is described in detail in the Standard and will be explained in more detail below. This isochronous data format header is called CIP header below. This CIP header is added to the beginning of each bus packet after the bus packet

header. This then ensures that the station which receives the transmitted bus packet can evaluate the data in the correct manner.

Although the CIP header largely remains constant throughout the isochronous data transmission, it must nonetheless be newly updated in one section (DBC entry). Added to this, however, is the fact that during isochronous data transmission, the said CIP header has to be present twice in the bus interface, since, on the one hand, a completely compiled bus packet can be sent onto the bus, while at the same time new data are provided by the application process, a new CIP header having to be created for these new data.

Owing to this difficulty, we initially considered a solution internally for the compilation of bus packets in which two separate special registers are provided for the CIP headers. The useful data of the respective bus packets are provided in a buffer memory. If a packet is to be sent via the bus, then a selection unit must read the correct CIP header from one of the two special registers and transfer it to the data transmitting unit at the correct point in time and then also fetch the associated data from the buffer memory and attach them to the CIP header.

The object of the invention is to simplify the solution described above, to be precise in such a way that the selection logic unit for joining together the CIP header and the associated useful data can as far as possible be omitted.

The invention achieves this object in such a way that, when the isochronous data transmission is set up, it writes the generated CIP header only to one special register and, in addition, also to the buffer memory for the useful data, in which case the useful data of the bus packet are subsequently attached to this CIP header in the buffer memory (see Claim 1). What is achieved as a result of this is that, for the transmission of the data via the bus, the data transmitting section only has to

access the buffer memory for the useful data, where CIP header and useful data are stored contiguously in the correct order. The data transmitting section thus obtains the data to be transmitted only via the buffer memory. A selection logic unit which determines the special register from which the CIP header has to be taken and the memory area of the buffer area from which the useful data have to be attached can be omitted.

Further improvements of the method are possible by virtue of the measures evinced in the dependent claims. According to Claim 2, the CIP header may contain a comparison value for data counting. This value must be updated for each bus packet. This is done in such a way that when the data of a bus packet are written to the buffer memory, the data are counted and, at the end, the comparison value, determined in this way, for the data count is updated in the CIP header, which is entered in the special register, and the updated CIP header is copied to the buffer memory at the next free location for a bus packet. The data of the next bus packet would then be attached in turn to this CIP header. Consequently, the useful data for the next bus packet are again stored contiguously in the buffer memory and they can be transported from there contiguously to the data transmitting section of the bus interface.

In this connection, it is advantageous if the data are counted in units of data blocks and the comparison value for the data count in the CIP header relates to the first data block in the respective bus packet. As a result, the solution then conforms to the abovementioned IEC 61883 Standard, which also stipulates that the comparison value DBC in the CIP header relates in each case to the first data block of a bus packet.

The following measures which specify the way in which the corresponding object of the invention is achieved are advantageous for an apparatus for carrying out the method according to the invention (see Claim 6). The apparatus comprises a buffer memory for the data of

bus packets. Furthermore, the apparatus comprises a memory management unit and a special register for a CIP header of a bus packet. The apparatus furthermore has initialization means which, when the isochronous data transmission is set up, copy the corresponding CIP header for the first bus packet both to the special register and to the buffer memory.

The CIP header for the isochronous data transmission to be set up is preferably prescribed by the application process in the transmitting station.

Also advantageous are the measures according to Claim 8, where it is defined that the apparatus furthermore has a data block counter, by which the data blocks of the isochronous data transmission are counted and whose counter reading at the corresponding point in time specifies the comparison value for the data count, which is entered into the special register in which the CIP header for the isochronous data transmission was stored during initialization. Furthermore, provision is made for the respective updated CIP header to be copied to the buffer memory, with the result that the correct CIP header is directly available again in the buffer memory for the next bus packet to be transmitted.

Drawings

Exemplary embodiments of the invention are illustrated in the drawings and are explained in more detail in the description below. In the figures:

Figure 1 shows the structure of a plurality of successive bus packets for isochronous data transmission, and

Figure 2 shows a block diagram of the apparatus according to the invention.

Exemplary embodiments of the invention

Figure 1 shows an exemplary sequence of transmitted bus packets. In the example shown, it is assumed that MPEG2-coded video data are to be transmitted

during the isochronous data transmission. For this case, the IEC 61883 Standard provides for 8 data blocks with MPEG2 video data to be transmitted per data source packet. The size of the data blocks is specified in units of quadlets in the abovementioned standard. The data block size can be programmed; to be precise, all values between one and 256 quadlets are possible. For the transmission of MPEG2 video data, the IEC 61883 Standard provides for a data block to have a size of 6 quadlets. Furthermore, it is assumed that in each case 8 data blocks are transmitted in a 1394 bus packet. This is possible according to the abovementioned standard and, in this case, all the data blocks of a data source packet can be completely transmitted in one bus packet. Figure 1 shows an exemplary sequence of transmitted bus packets. The first transmitted bus packet is illustrated at the top in Figure 1 and the second transmitted bus packet is correspondingly illustrated at the bottom in Figure 1. The precise structure of a bus packet for isochronous data transmission is specified in the abovementioned IEC 61886 Standard. Therefore, for the disclosure of the invention, reference is also expressly made to this standard.

In Figure 1, the reference numeral 10 designates the header of the bus packet. It contains the details regarding the data field of the isochronous data packet, to be precise in a number of bytes, and also further information, but this need not be discussed in any more detail below. The header 10 of the bus packet is followed by a data field. The latter extends through the area 11-19. At the end of the bus packet there also follows an area 20, in which a CRC check word is stored. A so-called CIP header is always provided at the beginning of the data field of a bus packet. CIP is the abbreviation of "Common isochronous packet". The CIP header contains a series of information items which describe the isochronous data transfer. Thus, e.g. an identification number SID of the data source is contained therein.

Furthermore, it stipulates the size of the subsequent data blocks in the bus packet. Likewise, a detail FN (fraction number) is also contained, which specifies the number of data blocks into which a data source packet is divided. As already mentioned, there are always 8 data blocks per data source packet in the case of MPEG2 video data. A further detail QPC (quadlet padding count) relates to how many padding quadlets are attached at the end of the data source packet in order to guarantee that the latter is divided into data blocks of the same size. Furthermore, an information item SPH (source packet header) is provided, which specifies whether a header for the data source packet is likewise also provided in the bus packet. Furthermore a DBC value (data block counter) is also provided. This value specifies which data block is the first data block in the bus packet referring to all the transmitted data blocks during the isochronous data transmission. Therefore, all the data blocks are consecutively numbered individually. This value practically constitutes a comparison value which can easily be used to check whether a bus packet has not been received. To that end, the received data blocks are all counted up in the receiver station. Each time a new bus packet is received, the DBC value contained therein is compared with the counted comparison value. Only if both values correspond have all the data blocks been received and no bus packet has been lost. Further information items in the CIP header include an FMT entry (format ID). This entry can be used to signal that the bus packet contains no data at all and is a so-called dummy packet. An FDF entry (format depending field) may also be defined, this being mentioned only for the sake of completeness, and also an SYT entry, which comprises a time specification for the bus packet.

The data blocks DBO-DB7 for the first data source packet SPO then follow in the subsequent areas 12-19. The entry 0 in the data area 11 is intended to indicate that the DBC value for this first bus packet is set to the

value 0, which is synonymous with the fact that the first data block in this bus packet has the number 0. The DBC value is automatically set to this value during the initialization of the isochronous data transfer. This will be explained in more detail below. This must, of course, also be taken into consideration for the comparison count. Therefore, the comparison count likewise begins at 0.

The next bus packet again contains 8 data blocks. In this case, they are the 8 data blocks DB0-DB7 of the second data source packet SP1. This may also be followed by further bus packets which are likewise constructed in the manner illustrated.

The relevant parts of a bus interface for the invention are illustrated in Figure 2. These components are parts of a data link layer circuit within the IEEE 1394 bus interface. The reference numeral 30 designates an I2C interface, to which an I2C bus 38 is connected. Via the I2C interface, the IEEE 1394 bus interface can be configured e.g. for isochronous data transmission. The necessary control data are prescribed by an application process via the I2C bus 38. The I2C interface 30 is connected via an internal bus 41 to further components of the bus interface. The reference numeral 32 designates a buffer memory for the data exchange. This buffer memory 32 is managed by the memory management unit 31. In other words, the memory management unit 31 divides the memory in such a way that the incoming and outgoing data are correctly forwarded to the components which each access the memory. The entire address control thus takes place with the aid of this memory management unit 31. It also serves as a bus master for the internal bus 41 and allocates it to the connected units by time division multiplexing.

Furthermore, an AV transceiver unit 33 is connected to the internal bus 41. This unit is in turn connected to a data bus 39, via which all the incoming and outgoing data are relayed to and from the

application. The AV transceiver unit 33 also comprises a DB counter 37. This DB counter counts up all of the data blocks received from the application. In accordance with the IEC 61883 Standard, this counter is an 8 bit counter.

As a further component, a register unit 34 is also connected to the internal bus 41. The said register unit also contains the already mentioned special register for the CIP header.

Further components which are also connected to the internal bus 41 relate to a data transmitting circuit 35 and a data receiving circuit 36. These circuits are connected to the physical layer IC of the 1394 bus interface. Their function, in the case of the transmission of data via the 1394 bus, is to take the corresponding bus packet data from the buffer memory 32 and forward them in the correct order to the physical layer IC. A further task of the data transmitting unit 35 is to perform the CRC check and to attach the corresponding CRC check data at the end of a bus packet. In the case of the 1394 bus, a separate CRC check is provided for the data in the 1394 header of the bus packet. This is likewise handled by the data transmitting unit 35. The data receiving unit 36 has corresponding tasks, namely CRC checking of a received bus packet separately for the 1394 header and for the useful data, and the extraction of the useful data from the bus packet and the forwarding of these data to the buffer memory 32.

The method of operation of the apparatus will now be explained in more detail below. If an isochronous data transfer is requested by the application process, the following takes place. The bus interface is initialized via the I2C interface 30, all the units being prepared for the isochronous data transmission. In particular, the CIP header for the isochronous data transmission, which header is prescribed by the application with the corresponding values, is entered on the one hand into the special register 38 and on the other hand at the first free location in the buffer memory 32 for a bus packet.

It should be mentioned here that the DPC comparison value in the CIP header is set to 0 on account of the initialization. Equally, the counter reading of the DB counter 37 is also reset to 0 as a result of the initialization. Furthermore, the entry for the 1394 header is written to the 1394 header special register 39. This entry depends on the entries in the special register for the CIP header 38. Since the 1394 header does not change throughout the isochronous data transmission, it is not absolutely necessary to transfer this 1394 header simultaneously to the buffer memory 32 as well. Specifically, it is possible to adopt the corresponding 1394 header from the special register 39 each time a bus packet is transmitted. After the 1394 bus interface has been set up for the isochronous data transfer requested, the useful data are supplied by the application via the bus 41. The AV transceiver unit 33 forwards the incoming data in corresponding memory words to the buffer memory 32. The integrated DB counter 37 counts up the data and is incremented each time a complete data block has been forwarded to the memory. The size of the data block is, after all, entered in the special register 38 and the DB counter 37 was set accordingly during the initialization process. After 8 data blocks have then been written to the buffer memory 32, the DB counter 37 outputs a control signal, whereby its current counter reading is transferred to the special register 38, to be precise at the location for the comparison value DBC. At the same time, this signal informs the memory management unit 31 that it should copy the updated CIP header in the special register 38 to the next free location for a bus packet in the buffer memory 32. Afterwards, further useful data can then be written to the buffer memory 32 via the AV transceiver 33. At the same time as new data are being written in, however, the data of the preceding bus packet can be output onto the 1394 bus via the data transmitting unit 35 and the physical layer IC. The memory management unit 31 allocates the internal bus 41 to the various

components by time division multiplexing. In this case, the internal bus 41 is designed in such a way that it can satisfy the bandwidth requirements of the individual components. After all, there is the added fact that via the data receiving unit 36, too, they may enter requirements for forwarding received data into the buffer memory 32, so that the bandwidth requirements of the latter must also be satisfied.

The fact that the CIP header for a bus packet to be transmitted resides in each case at the beginning of the assigned memory area for this bus packet in the buffer memory 32 ensures that when the bus packets are transmitted, first of all access can be made to the special register 39, where the 1394 header of the bus packet is stored, and then all of the further data can be taken from the buffer memory 32. This operation is simple to carry out and a relatively complicated switching logic arrangement is not necessary for this purpose.

Various adaptations and modifications of the exemplary embodiments described are possible. The structure with the various internal bus lines and bus lines provided for the external components, as described, may be chosen differently. Parts of the explained apparatus may also be realized by software. The invention is not restricted to use with the IEEE 1394 bus mentioned. It can also be used for other wire-based bus systems or else for a wire-free bus system.

Claims

1. Method for the compilation of data packets for isochronous data transmission via a data bus, called bus packets below, the data format for the isochronous data transmission being defined in an isochronous data format header (CIPH) of the bus packet, characterized in that when the isochronous data transmission is set up in a data transmitting device, the isochronous data format header (CIPH) is written both to a special register (38) and to a buffer memory (32) for bus packets, and in that the useful data of the bus packet are attached to the isochronous data format header (CIPH) in the buffer memory (32).

2. Method according to Claim 1, in which the isochronous data format header (CIPH) contains a comparison value for data counting, in particular data block counting, in which, when the data of a bus packet are written to the buffer memory (32), the comparison value for data counting in the isochronous data format header (CIPH), which is entered in the special register (38), is updated, and in which, after the completion of a bus packet in the buffer memory (32), the updated isochronous data format header (CIPH) is copied to the buffer memory (32) at the next free location for a bus packet.

3. Method according to Claim 2, in which the data are counted in units of data blocks (DBO-DB7), and in which the comparison value for counting data in the isochronous data format header (CIPH) relates to the first data block (DBO) in the bus packet.

4. Method according to one of Claims 1-3, in which the same number of data blocks (DBO-DB7) is always selected per bus packet.

5. Method according to one of the preceding claims, in which the data to be transmitted are divided into data source packets (SP0, SP1), and in which, in particular for the transmission of MPEG2 video data, a data source packet (SP0, SP1) is composed from 8 data blocks (DB0-DB7).

6. Apparatus for carrying out the method according to one of the preceding claims, having a buffer memory (32) for bus packets, having a special register (38) for the isochronous data format header (CIPH) of a bus packet, and having initialization means (30), which copy the isochronous data format header (CIPH) for the first bus packet of the isochronous data transmission to the special register (38) for the isochronous data format header (CIPH) and the buffer memory (32).

7. Apparatus according to Claim 6, in which the isochronous data format header for the first bus packet is prescribed for the initialization means (30) by an application process.

8. Apparatus according to Claim 6 or 7, which furthermore has a data block counter (37), by which the data blocks (DB0-DB7) of the isochronous data transmission are counted, and in which a memory management unit (31) is provided, which transfers the counter reading of the data block counter (37) after the counting of the data blocks of a bus packet to the isochronous data format header (CIPH) stored in the special register (38), and copies the isochronous data format header (CIPH) that has been updated in this way in the special register to the buffer memory (32) at the beginning of the next free location for a bus packet.

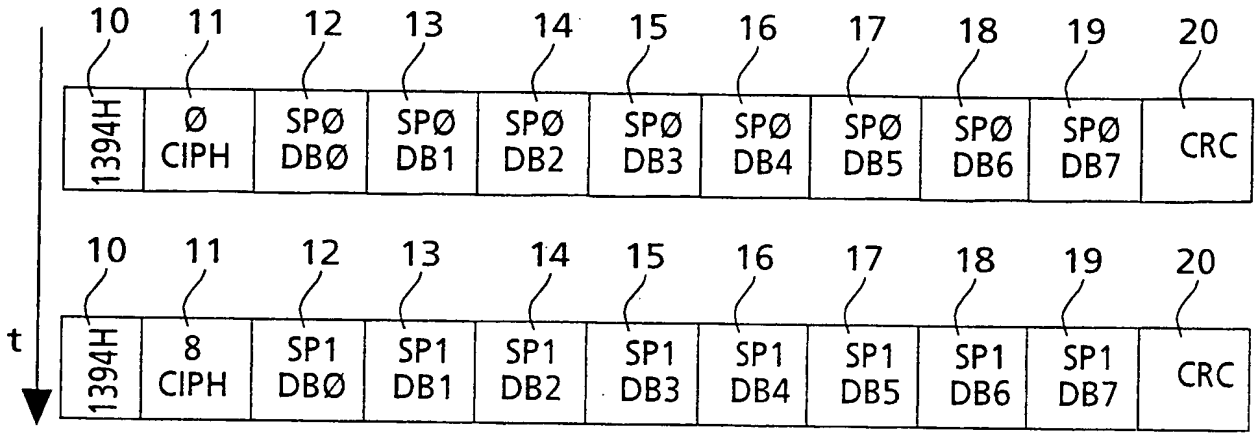
10
11
12
13
14
15
16
17
18
19
20
1394H
Ø CIPH
SPØ DBØ
SPØ DB1
SPØ DB2
SPØ DB3
SPØ DB4
SPØ DB5
SPØ DB6
SPØ DB7
CRC
t
1394H
8 CIPH
SP1 DBØ
SP1 DB1
SP1 DB2
SP1 DB3
SP1 DB4
SP1 DB5
SP1 DB6
SP1 DB7

Fig.1

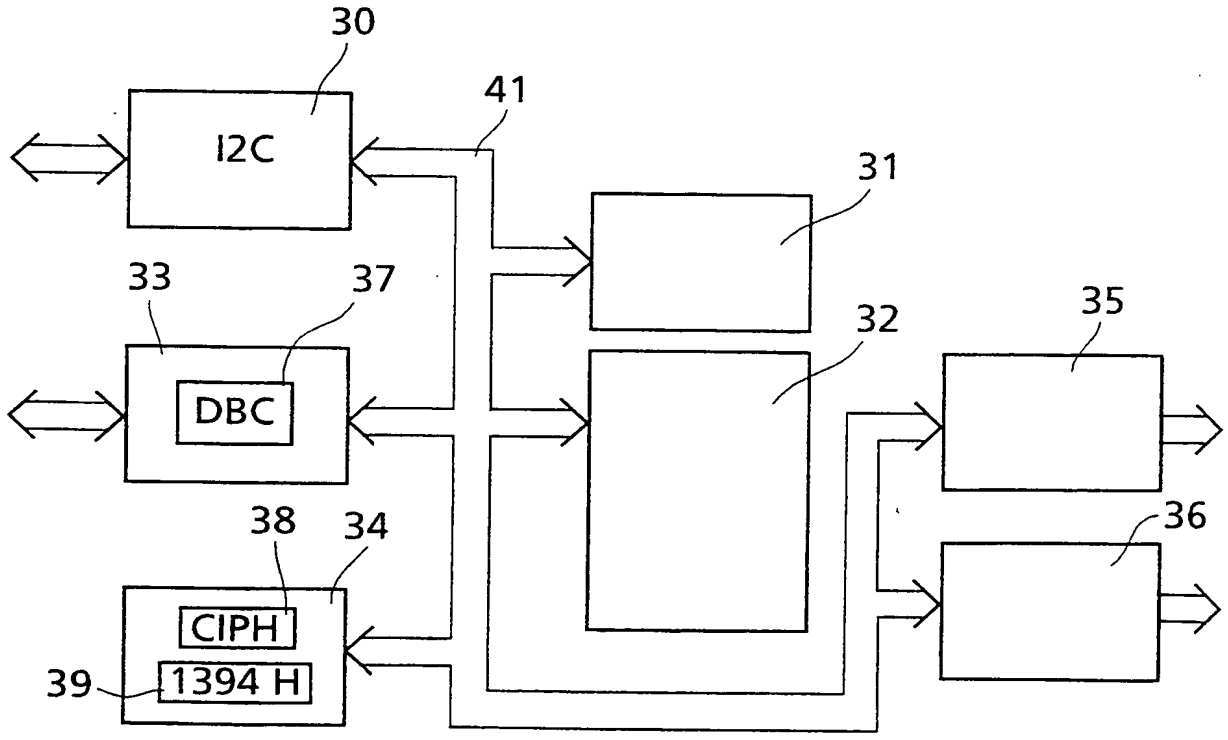
30
I2C
41
31
33
37
DBC
32
35
38
34
CIPH
1394 H
39
36

Fig.2